application of a connecting material, such as a solder paste, to the substrate or the first electrode. This method assumes that the second electrode is pre-formed on or pre-mounted to the substrate. In one embodiment, the solder paste may be applied to the substrate with a stencil, such as a 4 mil stencil. The stencil may be positioned on the substrate and solder paste may be applied to the top of the stencil and wiped across the stencil with a blade. The stencil is then removed from the substrate and solder paste left in the designated positions on the substrate.

[**0047**] Placement of the first electrode may be made with the aid of a specially designed placement bench. In some cases, a specialized vacuum chuck may be used to position and place the first electrode on the substrate so as to properly position the first electrode relative to the connecting material. In some cases, it may be advantageous to apply a force to the first electrode when bringing it into contact with the connecting material, for example, a force of 85 grams, to aid in setting the first electrode in place. Preferably, the first electrode is properly positioned so that it is adjacent to and spaced apart from a second electrode that is formed or mounted on the substrate. Once the first electrode is set in place, the substrate may be populated with other desired electrical components, such as capacitors, resistors and op-amps that may be required for proper functionality of the capacitive device.

[**0048**] A substrate that includes first and second electrodes and electrical components mounted to the substrate may then be bathed in a vapor electronic fluid, such as Fluorinert™ electronic fluid FC-70 made by 3M. The vapor from the vapor electronic fluid condenses on the substrate and causes reflow of the connecting material. After reflow, the substrate with its mounted components is allowed to cool. Other components may then be added to the substrate such as electrical leads that connect to the first electrode (via the connecting material) and the second electrode (for example, when the second electrode is a lead formed on the substrate).

[**0049**] Another step in the assembly of the capacitive device is cleaning the device. Cleaning the device may include washing the device with warm water or acetone, sonicating the device with acetone, and then drying the completed capacitive device.

[**0050**] Testing has shown that an embodiment of the present invention using the above disclosed materials and assembly steps provides for a very robust and durable capacitive device that maintains a high level of sensitivity and reliability.

[**0051**] The structure and material properties of the structured elements and other components of the capacitive device of the present invention may be important to the performance of the device. Preferably, the structured elements have a hardness that is greater than the hardness of the material used for the electrodes of the capacitive device. Specifically, the hardness of the structured element should be sufficient such that the electrodes deform prior to any measurable deformation of the structured elements and long before failure of the structured element. The G-400 series Zeeospheres™ disclosed above have a crush strength of <4,200 kg/cm^2, which is typically well above the elastic deformation point of the electrodes anticipated for use. Furthermore, the G-400 series Zeeospheres™ disclosed above have a hardness of 7 on the Mohs scale.

[**0052**] Another important property that must be considered when choosing the structural elements is the softening point of the structured element material. The softening point of the structural element must be at a much higher temperature than the melting and reflow temperature of the curable material, such as the solder (conductive curable material) discussed above. Zeeospheres™ have a softening point of about 1,020° C., which is well above the melting and reflow temperatures of any curable material anticipated for use with the present invention.

[**0053**] Another important property of the structured elements is the mean size of a sample of structured elements used. A given sample of structured elements will have a distribution of size about a mean value. In order to ensure a fixed predetermined maximum dimension of the structured element, screening of the structured element may be performed in order to remove structured elements having a size greater than a certain value. For example, the G-400 series of Zeeospheres™ has a mean value of 6 microns, but also has a 90th percentile size of 14 microns and a 95th percentile size of 19 microns. Thus, if the desired maximum dimension required for the capacitive device is 6 microns, it would be necessary to screen off all Zeeospheres™ with a diameter greater than 6 microns, even though the mean value is 6 microns.

[**0054**] Another important consideration for the structure elements is the volume content of the structured elements in the connecting material. In theory, only three structured elements are required in order to establish a plane for the first electrode. However, because of the uncertainty in the size of the structured elements in any given sample, a minimum number of structured elements must be included at each connecting point of the first electrode to the substrate to create a high probability that at least three of the structured elements having the predetermined maximum dimension are included for a given capacitive device. Preferably, a volume content of about 1 to 10% volume of structured elements in the connecting material ensures the necessary spacing. Thus far, it has been found that a volume of greater than about 10% structured elements may result in the connecting material becoming brittle or may alter the properties of the curable material in a negative way. However, using different types of curable material and flux along with certain structured elements may permit greater volumes of structured elements in the connecting material.

[**0055**] One advantage of using structured elements that have a predetermined maximum dimension is the resultant predictability in performance of any given capacitive device made using the same methods of manufacturing and materials. As a result of this predictability, if two or more such capacitive devices are used in a single device, such as a force-based touch sensor for a computer monitor, the force sensor may be more sensitive and locating the position of a touch input to the sensor may be more accurate. Furthermore, other important information about the touch input may be determined with improved results due to the use of the structured elements having a predetermined maximum dimension. This principal is directly applicable to the force-based sensor assembly **100** shown in **FIG. 1**. If each of the transducer assemblies **110**, **112**, **114**, **116** have spacing between the first and second electrodes that is defined by a predetermined maximum dimension of structured elements positioned between the electrodes, the sensitivity and accu-